

Space Suit Glove Pressure Garment Metacarpal Joint and Robotic Hand Analysis, Phase I

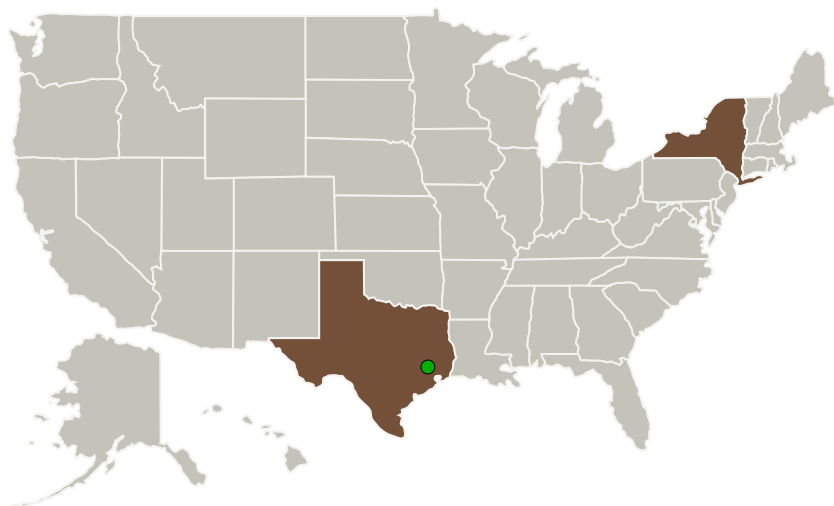
Completed Technology Project (2011 - 2011)



Project Introduction

Spacesuit glove pressure garments have been a design challenge for NASA since the inception of spacesuits. The human hand demands a complex range of motions, a close fit, an ease of movement, and a lack of bulk that is at odds with the engineering and durability requirements of an inflated safety garment. While precision motions of the fingers are relatively well met by NASA's current I.L.C./Phase VI gloves, the torque required for more gross power grips such as translating along bars or grasping tools is significant. This torque comes not from the individual fingers or phalange-phalange joints, but at the joint between the fingers and the palm, or the metacarpal-phalangeal joint. In addition, this motion is difficult to precisely measure. The human hand is capable of omni-directional multifaceted movements that are challenging to mimic robotically. In addition, the presence of a human wearer makes the measurement impossible to repeat accurately, but it is required to adequately reproduce the movements of the glove. FFD in collaboration with The Polytechnic Institute of New York University (NYU-Poly) propose to develop a glove patterning specific to the bending of the metacarpal-phalangeal joint, and a robotic instrument suitable to measure this torque. This will lead to even more functional glove pressure garments, and to a more refined way of measuring them.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Final Frontier Design	Lead Organization	Industry	Brooklyn, New York
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
New York	Texas

Project Transitions

**February 2011:** Project Start**August 2011:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/138522>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Final Frontier Design

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Theodore C Southern

Co-Investigator:

Ted Southern

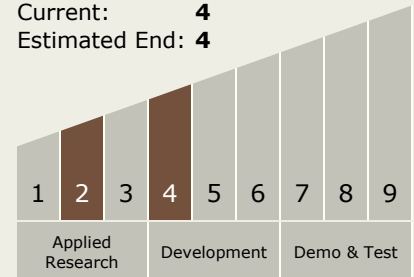
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Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.2 Extravehicular Activity Systems
 - └ TX06.2.1 Pressure Garment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System